SFWMD

Water Supply Contingency Plan

October 10, 2000

South Florida Water Management District

Water Supply Division

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I. Introduction and Background

Rainfall for the year 2000 has been below normal throughout the South Florida Water Management District. May was driest month on record for the State of Florida. Most of the groundwater and surface water systems were below normal at the end of the wet season. In response, District staff have developed this Water Supply Contingency Plan. The purpose of the plan is to ensure that the agency is prepared in case rainfall conditions are below normal or become extremely dry.

The goal of the plan is to provide advance notice of District actions that may be taken to minimize the likelihood, severity and duration of a water shortage; lessen impacts of drought on water users; and ensure that any incurred adversity is shared among urban, agricultural and natural systems demands.

The approach is to develop and analyze a set of options to manage water supply. These options are divided into three groups -- those that are most effectively implemented immediately, options that would be most effectively implemented during the wet season, and options that would be most effectively implemented in the dry season. Options will also be categorized according to whether they would most appropriately be implemented during moderate, severe, and/or extreme water shortage conditions. The list of options was developed and analyzed with input from other agencies, interest groups and the public. An assessment of current and predicted conditions and lake levels will be made every two weeks. Based on consideration of this assessment and public input, decisions will be made by the Governing Board and District staff concerning implementation of options.

This report describes the selection, evaluation and decision-making processes, the options examined, results of the option analysis, funding sources and implementation strategy.

II. Plan Development Process

SFWMD staff developed a list of potential water supply management options, proposed management approaches and a contingency plan to implement these options The initial list of potential water supply options to be considered was developed in conjunction with water users. District staff were then assigned responsibility for specific options.

Internal meetings were held to review all of the options, compile the results and develop a preliminary draft of an overall water supply contingency plan. The Contingency Plan was then circulated to other agencies, local governments, utilities and other interested parties to solicit comments. Public meetings were held to compile those comments and address critical issues. Based on the review and comments a final contingency plan will be developed for submittal to the Governing Board.

III. PROPOSED OPTIONS

The list of options was developed by District staff and water users during initial brainstorming sessions. District staff (see below) were assigned to further consider the following types of options:

1. Move Water from WCA-1 Storage to Lake Okeechobee
2. Allow Deviation from the Water Conservation Area 1 Schedule
3. Investigate Feasibility of Using Temporary Pumps and Structures
4. Kissimmee Chain of Lakes Operational Flexibility
5. Allow Deviation in WCA-2A Schedule to Provide Additional Storage
6. Cloud Seeding
7. Develop and Implement Modified Supply Side Management Plan
8. Revise BMP Makeup Water Deliveries during Droughts
9. Modify Water Levels that are Used to Trigger Water Restrictions
10. Expanded Water Shortage Web Page
11. Reduce Deliveries to Maintain LEC Canal Levels
12. Ch. 298 District Conservation Plans and System Improvements
13. Implement the Brighton Seminole Indian Tribe Reservation Compact and Lower Istokpoga Basin Options
14. C-139 Basin Storage Options
15. Broward County Options to diversify supply sources
16. S-47 A - D Operations
17. Withhold STA Supplemental Water Deliveries
18. Caloosahatchee River Salinity Control
19. Modify Caloosahatchee River Utility Disinfection Technology
20. Water Conservation Projects -- Landscape Irrigation Retrofit and Education
21. Water Conservation Projects -- Year-Round Landscape Irrigation Guidelines
22. Lake Okeechobee Stormwater Back Pumping For Water Supply
23. Use Pumps at S-2 and S-3 in Reverse Direction
24. Improve Capacity to Pump Water out of Lake Okeechobee at Low Lake Stages
25. Comprehensive Water Conservation Education Program

IV. OPTIONS ANALYSIS

Option Evaluations

Each option was assigned to group of District staff. Staff members were responsible for describing and evaluating the options assigned to them. Evaluations of the various options are provided as **Attachment I** to this Report. Each evaluation included the following eight components:

- Option Number and Description.
- Time Frame Considerations -- At what point in the year (wet/dry season) and under what degree of water shortage (moderate/severe/extreme) would this option be implemented?
- Implementation Time -- How long would it take to implement this option?

- Implementation Components — What steps would be necessary for implementation?
- Responsibility — Who would be responsible for implementation?
- Water Use Benefits — What are the potential benefits to water users (type, timing, duration, magnitude)
- Water Resource Benefits — What are the potential benefits to water resources (timing, duration, and magnitude)?
- Water Resource Impacts — What are the potential negative impacts to water resources (water quality, water delivery timing, duration, and magnitude)?

Timing of Implementation Activities

The overall list of options was divided into three groups:

- options that are most effective if implemented immediately,
- options that are most effective if implemented during the remainder of the wet season, and
- options that are most effective if implemented during the dry season.

The division was not clear cut, since many of the options had pieces or components that could be implemented during all three periods. For example, in order to implement Option 2: Allow Deviation from the Water Conservation Area 1 Schedule, discussions with affected entities such as the Arthur R. Marshall Loxahatchee National Wildlife Refuge, the Lake Worth Drainage District and U.S. Army Corps of Engineers should begin immediately. Implementation of a lower water level for WCA-1 would not occur until the dry season.

Severity of Water Shortage

The list of options ranges from actions with little or no cost (monetary and environmental) to actions with high cost. The amount of water supply benefit that can be realized from any given option also varies widely. Options with a high environmental and/or monetary cost and high water supply benefit may not be appropriate for implementation in a moderate water shortage situation. On the other hand, that same option may be appropriate for implementation in an extreme water shortage situation. Therefore, it is appropriate to evaluate the cost of implementing an option and the potential water supply benefits that could be realized versus the severity of the water shortage. Each option was evaluated on this basis and categorized into the following three groups:

1) Options that would most appropriately be implemented in moderate water shortages.
2) Options that would most appropriately be implemented in severe water shortages.
3) Options that would most appropriately be implemented in extreme water shortages.

In general, options that are appropriate for implementation in a moderate water shortage are also appropriate for implementation in an extreme water shortage. However, not all options that are appropriate for an extreme water shortage situation may be appropriate in a more moderate water shortage situation. The result of the analysis of timing and severity considerations for the various options are summarized in a matrix format in **Table 1**.

Table 1. Implementation Matrix -- Water Supply Contingency Management Options

Related Option	Immediate Implementation	Wet Season Implementation	Dry Season Implementation	Shortage Severity*
1. Move water from WCA-1 Storage to Lake Okeechobee	Begin discussions with LWDD and ACOE on backflowing WCA-1 water to Lake			1,2,3
		Backflow water from WCA-1 to Lake		1,2,3
2. Allow Deviation from the WCA-1 Schedule	Begin discussions with USFWS and ACOE on relaxing WCA1 floor			
			Relax WCA-1 floor	2,3
3. Investigate Feasibility of Temporary Pumps and Structures		Inventory availability of portable pumps, lease options and use of temporary structures		1,2,3
		Develop portable pump and temporary structure deployment protocol		1,2,3
4. Kissimmee Upper Chain of Lakes Operational Flexibility			Deploy portable pumps and temporary structures	
		Initiate discussions on discretionary releases from Upper Chain of Lakes to Lake Okeechobee		1,2,3
			Implement discretionary releases	1,2,3
5. Allow Deviation in WCA-2A Schedule to Provide Additional Storage	Initiate discussions with FFWCC, USACE and Broward utilities on WCA-2 schedule deviations			1,2,3
		Begin regional modeling to evaluate operating strategies		2,3
		Begin schedule deviation		2,3
			Continue schedule deviation	2,3
6. Cloud Seeding		Implement cloud seeding		3
7. Develop and Implement Modified Supply Side Management		Develop Modified Supply Side Management Plan		1,2,3
			Implement Modified Supply Side Management Plan	2,3
8.Revise BMP Makeup Water Deliveries During Droughts	Develop alternative delivery schedule			1,2,3
		Obtain Board approval		1,2,3
			Implement	1,2,3
9. Modify Water Shortage Trigger Levels	Improve water shortage monitoring network	Develop water shortage triggers		1,2,3
			Implement water restrictions based on triggers	2.3
10. Expanded Web Page	Implement Contingency Plan Link			1,2,3
		Build Web Page		1,2,3
			Build Web Page	1,2,3

1=moderate; 2= severe; 3=extreme water shortage conditions

Table 1. Implementation Matrix (Cont.)

Related Option	Immediate Implementation	Wet Season Implementation	Dry Season Implementation	Shortage Severity*
11. Reduce Deliveries to Maintain LEC Canal Levels	Initiate discussions with coastal utilities on reducing canal stages, increased use of ASR and shifting pumpage			1,2,3
		Conduct sensitivity modeling		2,3
			Implement option	2,3
12. Chapter 298 District Conservation Plans and System Improvements		Identify 298 districts and other relevant entities		1,2,3
		Identify existence of water conservation and/ or water shortage plans.		1,2,3
		Initiate discussions with key external staff		1,2,3
		Compile actions for implementation -- prioritize improvements and identify funding sources		1,2,3
			Implement actions	2,3
13. Brighton Reservation and Lower Istokpoga Basin Options			Initiate water supply deliveries to Brighton Reservation based on agreement C-4121	2,3
14. C-139 Basin Operational Flexibility		Investigate Options		1,2,3
			Implement Options, if feasible	2,3
15. Broward County options to diversify supply sources		Initiate surface water operational protocol discussions with Broward County		1,2,3
			Initiate agreed-upon operational protocols	2,3
		Explore most effective use of county's 2A ASR wells		1,2,3
			Implement conversion of ASR well	2,3
		Conduct engineering analyses for temporary structure or pump on C-3		1,2,3
			Install temporary structure and/or pump on C-3; maintain higher stages	2,3
	Begin discussions to establish C- 14/ Prospect wellfield interconnect			1,2,3
		Complete interconnect		2,3
		Explore best use of Prospect ASR well		1,2,3
			Implement ASR option	2,3
		Develop interconnection plan for 3A wellfield		1,2,3
			Implement inter-connection strategy	2,3
		Develop plan to increase recharge in Dixie Wellfield		1,2,3
			Implement recharge Plan	2,3
		Evaluate feasibility of increasing production from Piccolo wellfield		1,2,3
			Implement increased production	2,3

* 1=moderate; 2= severe; 3=extreme water shortage conditions

Table 1. Implementation Matrix (Cont.)

Related Option	Immediate Implementation	Wet Season Implementation	Dry Season Implementation	Shortage Severity*
16. Water Shortage Protocols for S-47A-D in C-19 Basin		Develop protocols		1
			Implement protocols	2,3
17. Withhold STA Deliveries		Develop protocol		1,2,3
			Implement	2,3
18. Improve salinity control in Caloosahatchee River		Repair bubble curtain at S-79		1,2,3
			Operate bubble curtain	1,2,3
		Develop protocol to reduce S-79 lockages		1,2,3
			Reduce lockages at S79 in accordance with protocol	2,3
		Evaluate discharges required for salinity control in the Caloosahatchee		1,2,3
			Implement reduced discharges	2,3
19. Modify disinfection methods used by Caloosahatchee River utility		Discuss low-flow chlorination methods with Caloosahatchee utilities		1,2,3
			Implement low-flow chlorination methods	2,3
20. Urban BMP Program		Develop program		1,2,3
			Implement program	1,2,3
21 Landscape Irrigation Guidelines		Develop approach		1,2,3
			Implement guidelines	1,2,3
22. Lake Okeechobee Storm Water Backpumping for Water Supply	Monitor Lake Okeechobee habitat and water quality condition			1,2,3
		Evaluate backpumping options that have the least environmental damage vs. most water supply benefit		1,2,3
		Initiate backpumping		3
23. Reverse pumps at S-2 and S-3	Evaluate feasibility as a long-term capital project			1,2,3
			Implement pump modifications, if feasible	3
24. Improve capacity to pump water from Lake Okeechobee at low lake stages	Develop concept			1,2,3
		Design and construct facilities		2,3
			Operate facilities	3
25. Comprehensive Water Conservation Education Program		Inventory existing media products – update and upgrade		1,2,3
			Initiate media campaign	2,3

1=moderate; 2= severe; 3=extreme water shortage conditions

V. IMPLEMENTATION STRATEGY AND PROCESS

Projecting Water Conditions

Throughout the duration of the period of concern for water shortage, the District will conduct periodic evaluations of projected water conditions. Generally, these projections will involve computer simulations based on various rainfall assumptions to evaluate potential future water supplies. Long range forecasts, such as those generated by the National Climate Prediction Center, will be incorporated into projections for water conditions.

A major tool that will be used for this effort is the Lake Okeechobee Position Analysis (Obeysekera et al., 1999). The Position Analysis will generate simulations of likely Lake Okeechobee stages based on the current state of the system and historic rainfall patterns that have been analyzed to determine the most likely outcomes, given the rainfall forecast. The Position Analysis will be conducted on a monthly or semimonthly basis, depending on the existing conditions. Other types of water condition projections may also be incorporated into the water shortage management efforts as appropriate.

Formulating Recommendations

The District will conduct monthly or semimonthly Lake Okeechobee Position Analyses and projections of water conditions. The entire range of options will be evaluated for implementation at that time, based on the following considerations:

- Existing water conditions
- Projected water conditions
- Short term and long term weather forecasts
- Current severity of water shortage and demand characteristics
- Time of year
- Option cost and environmental impact
- Water supply benefit
- Input and comments from other agencies, interested parties and the public

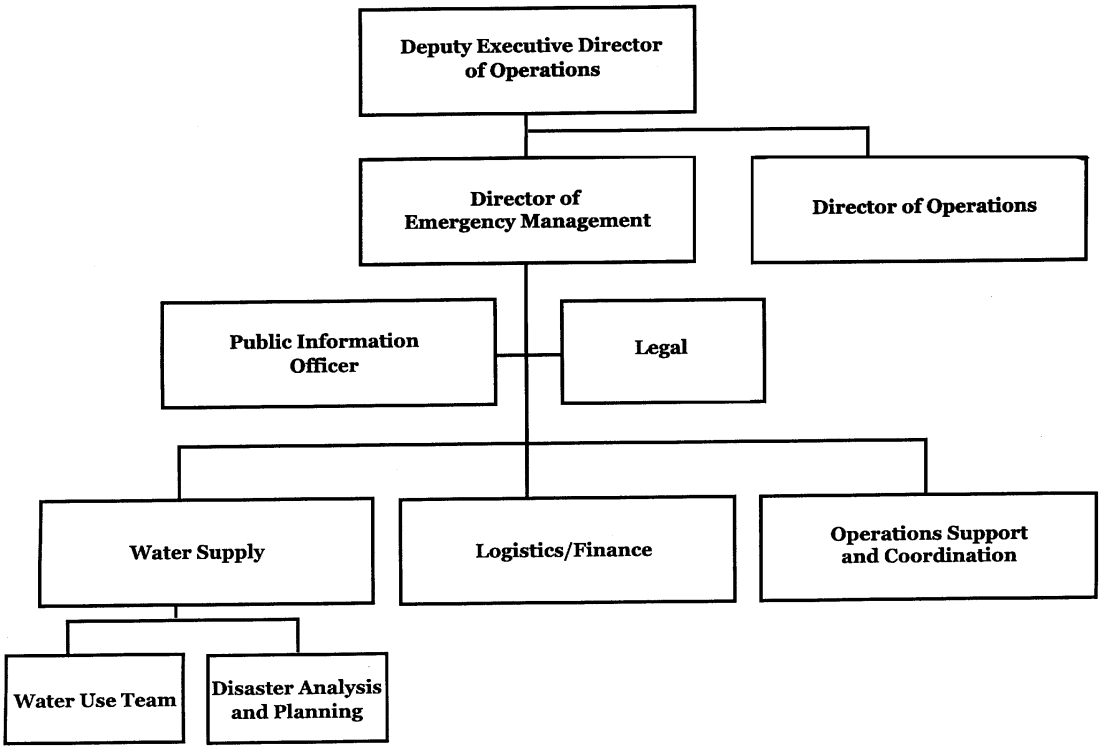
Options that are appropriate for implementation will be brought forward. In this manner, recommendations for implementation of options will be made on an iterative basis. Some options may require Director or Governing Board action for implementation, whereas other options may be implemented directly by District staff. A few options will also require approval from other entities prior to implementation.

Drought Management Team

The District has established a Drought Management Team under the auspices of the Emergency Operations Center (EOC) in order to develop and implement this plan. This organizational structure is designed to provide effective direction, control and coordination in response to a wide range of emergency conditions. As emergency situations threaten or occur, Emergency Management

activates the EOC to facilitate evaluation and incident planning as well as implementation of emergency functions and resources. The EOC is also the key to successful response and recovery operations. With decision and policy makers located together, personnel and resources can be used efficiently. Coordination of activities will ensure that all tasks are accomplished, minimizing duplication of efforts.

Figure 1. Drought Management Team Organizational Structure.



VI. FUNDING

Many of the options identified in this plan would be costly to implement and are unbudgeted (pumping costs, facility construction, equipment rental, etc.) A number of funding options are available to support such unbudgeted emergency plans. The intent of the analysis is to avoid proposing "unfunded emergency line-items" that would be difficult to justify during the budget development process. Instead, some of other options that may be used include the following:

a) Incurring short term borrowing.

b) Redirecting funds from other programs

c) Deferring FY01 budget priorities.

d) Unencumbering funds on existing contracts

e) Using budgeted contingency reserves.

f) Using undesignated emergency reserves/economic stabilization reserves.

Additional options may be identified as we proceed. The first step is develop the plan in

sufficient detail so that total funding requirements, distribution over time and financing options can be more clearly identified.

VII. REFERENCES

Obeysekera, J.A., Paul Trimble, Luis Cadavid,., Ray Santee, and Cary White. 1999. Use of Climate Outlook for Water Management in South Florida, USA. South Florida Water Management District (http://www.sfwmd.gov) , West Palm Beach, Florida 33416, USA.